23. (Twice Amended) The encoder/decoder of claim 22, characterized by said codebook selector cyclically stepping through each excitation codebook identification in a set of excitation codebooks.

24. (Twice Amended) The encoder/decoder of claim 22, wherein said excitation codebook selector randomly steps through each excitation codebook identification in a set of excitation codebooks.

25. (Amended) An algebraic multi-codebook structure, wherein

each excitation codebook being selectable and having separate tracks with different predetermined allowed pulse positions and excluded pulse positions; and

each selectable excitation codebook having different excluded pulse positions.

REMARKS

Reconsideration and allowance are respectfully requested in view of the foregoing amendments and the following remarks.

Claims 1-25 are currently pending. In the Office Action mailed April 25, 2002, claims 1-3, and 6-24 were rejected under 35 U.S.C. 103(a) as being unpatentable over Deller et al. (1987, Discrete-Time Processing of Speech Signals, hereinafter "Deller") in view of McCree (U.S. Patent No. 6,122,608, hereinafter "McCree"). Claims 4-5 were rejected under 35 U.S.C. 103(a) as being

unpatentable over Deller et al. and McCree, in view of Heidari et al. (U.S. Patent No. 6,055,496, hereinafter "Heidari"). Claim 25 was rejected under 35 U.S.C. 103(a) as being unpatentable over Minde et al. (U.S. Patent No. 5,991,717, hereinafter "Minde"). Claims 1-3, 6-9, and 12-25 have been amended to further clarify the invention. Support for these amendments may be found on page 1, lines 10-11 of the application. No new matter has been introduced. A marked-up version of the amended claims is attached as Appendix A, and a clean copy of the pending claims is attached as Appendix B.

The principles of the present invention are generally directed to a multi-codebook CELP encoding/decoding method and apparatus, and a multi-codebook structure. To perform the encoding/decoding operations on signal blocks, a corresponding excitation codebook identification representing an excitation codebook is selected by utilizing a deterministic selection procedure that is independent of signal type, and applied to the signal blocks.

Deller generally describes a standard code-excited linear prediction (CELP) analysis-by-synthesis speech coder and synthesizer. The standard structure of the CELP coder of Deller is one well understood in the art. The standard CELP coder includes a single Gaussian excitation codebook, a cascade of a pitch synthesis filter, and a spectral envelope (LP) synthesis filter. The pitch parameters for the pitch synthesis filter, the linear prediction (LP) parameters for the spectral envelope synthesis filter, and a gain factor for scaling each codeword of the excitation codebook are determined from the properties of the speech sample to be coded. Each codeword of the excitation codebook is scaled by the gain factor and used to excite the pitch synthesis filter and the spectral

envelope (LP) synthesis filter to generate a synthetic speech sample. The synthetic speech sample is compared with the original speech to determine the codeword within the excitation codebook to minimize the error energy. Parameters that represent an index to the selected codeword within the excitation codebook, the gain factor, the pitch parameters, and the LP parameters are transmitted by the CELP coder to represent the original speech sample. During synthesis, the CELP synthesizer receives each of the parameters and uses the codeword represented by the index, the gain factor, the pitch parameters, and the LP parameters to generate synthetic speech.

McCree is generally directed to the quantization of the LPC coefficients of a Mixed Excitation Linear Prediction (MELP) coder. A switched predictive multi-stage vector quantization method using a pair of vector quantization codebook sets is used to quantize the LPC coefficients (represented by line spectral frequency vectors) in order to more efficiently represent the LPC coefficients for transmission. The vector quantization codebook is significantly different in terms of use from an excitation codebook.

Independent claim 1, as amended, is directed to a multi-codebook fixed bitrate CELP signal block encoding/decoding method that includes selecting, for each signal block, a corresponding excitation codebook identification utilizing a deterministic selection procedure that is independent of signal type and encoding/decoding each signal block by using an excitation codebook having the selected excitation codebook identification. As provided in the Office Action, Deller does not specifically teach multiple codebooks or a selection procedure for selecting one of a multiple of

codebooks for encoding/decoding a signal block (see, page 2, item 3). Further, Deller utterly fails to teach or suggest multiple excitation codebooks for encoding/decoding a signal block.

McCree fails to overcome the deficiencies of Deller. While Deller shows an excitation codebook, which is generally standard for CELP coders as understood in the art, Deller completely fails to teach or suggest utilizing multiple excitation codebooks for encoding/decoding operations. Deller and McCree, taken alone or in combination, further fail to teach or suggest selecting one of the excitation codebooks in performing the encoding/decoding. As previously described, McCree is directed to the quantization of the LPC coefficients in a MELP speech coder using vector quantization codebooks. Vector quantization codebooks for efficiently quantizing the LPC coefficients of a speech coder are not equivalent or analogous to excitation codebooks used in CELP encoding/decoding. In addition, the MELP coder described by McCree uses a periodic pulse train or white noise as an excitation signal, and does not use an excitation codebook.

Accordingly, it would not obvious to combine the teachings of Deller, which describes a standard CELP coder/synthesizer having a single excitation codebook, with those of McCree, which describes the use of vector quantization codebooks for the quantization of LPC coefficients, to produce Applicants' claimed invention of claim 1. Additionally, neither Deller nor McCree teach or suggest, selecting, for each signal block, a corresponding codebook identification of an excitation codebook utilizing a deterministic selection procedure that is independent of signal type. In view of the foregoing, Applicants respectfully submit that the invention of claim 1 is not taught or suggested by either Deller or McCree, either taken alone or in combination.

Independent claim 12, as amended, is directed to a multi-codebook fixed bitrate CELP signal block encoder/decoder that includes "an excitation codebook selector...a corresponding excitation codebook identification ...and a means for encoding/decoding each signal block by using an excitation codebook having said selected excitation codebook identification." For similar reasons as those discussed in regard to the rejection of claim 1, Applicants respectfully submit that the invention of claim 12 is not taught or suggested by either Deller or McCree, alone or in combination.

Independent claim 19, as amended, is directed to an excitation codebook selection method for multi-codebook fixed bitrate CELP signal block encoding/decoding including selecting, for each signal block, a corresponding excitation codebook identification utilizing a deterministic selection procedure that is independent of signal type, where the excitation codebook identification identifies a particular excitation codebook. For similar reasons as those discussed in relation to claim 1, Applicants respectfully submit that the invention of claim 19 is also not taught or suggested by Deller or McCree, either taken alone or in combination.

Independent claim 22, as amended, is directed to a codebook selection apparatus for multi-codebook fixed bitrate CELP signal block encoding/decoding including an excitation codebook selector for selecting, for each signal block, a corresponding excitation codebook identification utilizing a deterministic selection procedure that is independent of signal type, where the excitation codebook identification identifies a particular excitation codebook. For similar reasons as those discussed in relation to claim 1, Applicants respectfully submit that the invention of claim 22 is also not taught or suggested by Deller or McCree, either taken alone or in combination.

Claims 2-11, 13-18, 20-21, and 23-24, are dependent from independent claims 1, 12, 19, and 22, respectively. Accordingly, Applicants respectfully submit that claims 2-11, 13-18, 20-21, and 23-24 are also not taught or suggested by Deller or McCree, either taken alone or in combination.

With regard to claims 4-5, these claims are dependent upon and include the limitations of independent claim 1. As previously discussed, neither Deller nor McCree teach or suggest the invention of claim 1 (*e.g.*, multiple excitation codebooks for encoding/decoding a signal block). Heidari fails to cure the deficiencies of Deller and McCree. For example, Heidari fails to teach or suggest selecting, for each signal block, a corresponding excitation codebook identification utilizing a deterministic selection procedure that is independent of signal type. Accordingly, Applicants respectfully submit that the claimed invention of claims 4-5 is also not taught or suggested by Deller, McCree, or Heidari, taken alone or in combination.

With regard to independent claim 25, this claim is directed to an algebraic multi-codebook structure, where each excitation codebook is selectable and has separate tracks with different predetermined allowed pulse positions and excluded pulse positions. Further, each selectable excitation codebook has different excluded pulse positions. Minde describes the use of a single adaptive and single fixed codebook, neither of which is selectable, as both are continuously utilized during operation of the coder. As such, Minde utterly fails to teach or suggest multiple excitation codebooks in which each excitation codebook is selectable. McCree does not cure the deficiencies of Minde. As described in relation to claim 1, McCree is directed to the quantization of the LPC coefficients in a MELP speech coder using vector quantization codebooks, not to excitation

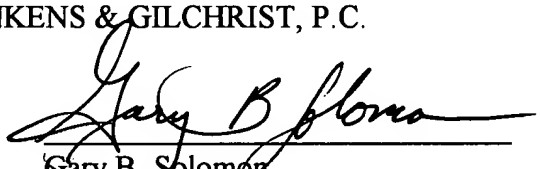
codebooks. The MELP coder described by McCree uses a periodic pulse train or white noise as an excitation signal, not an excitation codebook. Accordingly, neither Minde nor McCree teach or suggest an algebraic multi-codebook structure where each excitation codebook is selectable and has separate tracks with different allowed pulse positions and excluded pulse positions, and each selectable excitation codebook has different excluded pulse positions. In view of the foregoing, Applicants respectfully submit that the invention of claim 25 is not taught or suggested by Minde or McCree, either taken alone or in combination.

In view of the above, it is believed that this application is in condition for allowance, and such a Notice is respectfully requested.

Should the Examiner have any further questions or comments facilitating allowance, the Examiner is invited to contact Applicant's representative indicated below to further prosecution of this application to allowance and issuance.

Respectfully submitted,

JENKENS & GILCHRIST, P.C.

By: 

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